

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of)	
)	
RIVERS, Gordon, Thomas and CROSBY,)	
Daniel, Lee)	
Serial No. 10/526,298)	Group Art Unit: 1797
)	
Filed October 15, 2005)	Examiner: Brian McCaig
)	
METHOD AND COMPOSITIONS FOR)	September 18, 2009
INHIBITING FORMATION OF)	
<u>HYDROCARBON HYDRATES</u>)	

COMMISSIONER FOR PATENTS
Alexandria, VA 22313-1450

Sir:

PRE-APPEAL BRIEF REQUEST FOR REVIEW

In response to the Final Office Action mailed April 14, 2009, please consider the remarks which follow.

Please charge any necessary extension or other fees to avoid abandonment to Shell Oil Company, Deposit Account No. 19-1800.

REMARKS

Claims 1-5, 9-13, and 17-18 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,900,516 ("Talley") in view of WO 01/77270 ("Klomp") and U.S. Patent No. 5,583,273 ("Colle"). This rejection is respectfully traversed.

Independent claims 1, 9, and 17 recite, inter alia, a composition for inhibiting formation of hydrocarbon hydrates that includes at least one dendrimeric compound having a number average molecular weight of at least 1,000 atomic mass units [hereinafter referred to as "large"]; and at least one small molecular weight species having less than 1,000 atomic mass units [hereinafter referred to as "small"], selected from the group consisting of polyalkyleneimine, polyallylamine, starch, sugars, and polymers or copolymers of vinyl alcohol or allyl alcohol.

As discussed in the present application, compositions for inhibiting the formation of hydrocarbon hydrates in accordance with embodiments of the present disclosure, i.e., those which include a combination of at least one "large" dendrimeric compound and at least one "small" species selected from the group consisting of polyalkyleneimine, polyallylamine, starch, sugars, and polymers or copolymers of vinyl alcohol or allyl alcohol, minimize the problems associated with the production of hydrocarbon hydrates, such as blockage and/or plugging of pipelines or transfer lines or other conduits, valves and/or safety devices and/or other equipment, which may result in shutdown, loss of production, and risk of explosion or unintended release of hydrocarbons into the environment, compared to typical inhibitor compositions known in the art. Specifically, inhibitor compositions according to embodiments of the present disclosure are desirable because they allow for the inhibition of hydrate formation in many different environments, e.g., mixtures containing many hydrocarbons, as well as mixtures containing hydrocarbons and/or non-hydrocarbons. Moreover, compositions according to embodiments of the present disclosure are particularly useful for lighter or low-boiling, C1-C5 hydrocarbon gases, non-hydrocarbon gases, or gas mixtures at ambient conditions.

Talley teaches a method for inhibiting the formation of clathrate hydrates in a fluid having water and hydrate-forming constituents, wherein the inhibitor is a substantially water-soluble polymer having a guest group, a polymer backbone, and an anchor group positioned therebetween, wherein the anchor group is a hydrophilic compound having between one and four hydrogen bonding atoms, and wherein the guest group is either hydrophobic or amphiphilic. Specifically, Talley discloses that the operative principle for the inhibitor is that the guest/anchor groups present on the inhibitor work together to stabilize a shell of water molecules around the guest, which are held intact by the anchor group hydrogen bonded to at least one of the shell's water molecules.

Talley does not, however, teach or suggest the use of a combination of at least one "large" dendrimeric compound and at least one "small" species selected from the group consisting of polyalkyleneimine, polyallylamine, starch, sugars, and polymers or copolymers of vinyl alcohol or allyl alcohol, as required by independent claims 1, 9, and 17.

Klomp teaches a method for inhibiting formation and/or accumulation of hydrates in a flowable mixture by adding an amount of a dendrimeric compound to the mixture and then flowing the mixture containing the dendrimeric compound through a conduit. Similar to the inhibitor taught by Talley, the dendrimeric compound taught by Klomp contains a guest group, a water-soluble backbone, and an anchor group. Klomp further teaches that the dendrimeric compound preferably has a number average molecular weight of at least 500 g/mol (or 500 amu), and more preferably between 670 and 5000.

However, Klomp does not teach or disclose using a combination of at least one "large" dendrimeric compound and at least one "small" species selected from the group consisting of polyalkyleneimine, polyallylamine, starch, sugars, and polymers or copolymers of vinyl alcohol or allyl alcohol, as recited in independent claims 1, 9, and 17, and thus does not remedy the defects of Talley.

Colle teaches a method for inhibiting formation of clathrate hydrates in a fluid by introducing a concentrated solution of mixture of one or more inhibitors to a petroleum fluid stream having an aqueous phase. Similar to the inhibitor taught by Talley and Klomp, the inhibitor taught by Colle is a substantially water-soluble polymer having components that correspond to the backbone, and anchor and guest groups taught by

Talley and Klomp. The Examiner asserts that Colle discloses a small molecular weight species having less than 1,000 amu; however, Applicant respectfully disagrees and notes that Colle expressly teaches that “[p]referred molecular weights for the inhibitors of [Colle’s] invention are 20,000 to 500,000.” (See col. 7, lines 20-21).

Although Colle discloses that molecular weights may range from 1,000 to 1,000,000, such assertion does not teach or suggest using a combination of at least one “large” dendrimeric compound and at least one “small” species selected from the group consisting of polyalkyleneimine, polyallylamine, starch, sugars, and polymers or copolymers of vinyl alcohol or allyl alcohol, as recited in independent claims 1, 9, and 17, and thus does not remedy the defects of Talley or Klomp, discussed above.

The Examiner asserts that it would have been obvious to one of ordinary skill in the art to use the dendrimer compound of Klomp and the species of Colle in the composition of Talley to arrive at the present invention. The Examiner further asserts it would have been obvious to substitute the dendrimer compound of Klomp and the species of Colle in the composition of Talley. However, Applicant respectfully notes that it would not have been obvious to one of ordinary skill in the art to combine or substitute the inhibitors of both Klomp and Colle in the composition of Talley because none of the references contain a suggestion or motivation to do so. To establish a prima facie case of obviousness, there must be a suggestion or motivation to combine the referenced teachings and a reasonable expectation of success. In re Vaeck, 947 F.2d 488, 493 (Fed. Cir. 1991). “The mere fact that the prior art can be modified in the manner suggested by the Examiner does not make the modification obvious unless the prior art suggested the desirability of the modification.” In re Fritch, 972 F.2d 1260, 1266 (Fed. Cir. 1992).

Furthermore, both the inhibitors taught by Klomp and Colle possess substantially similar properties to the inhibitor taught by Talley, i.e., they are substantially water-soluble polymers having a polymer backbone, an anchor group, and a guest group. Thus, it would not be obvious to use or substitute both the inhibitors taught by Klomp and Colle into the composition of Talley. More importantly, even if both the inhibitors taught by Klomp and Colle were substituted into the composition of Talley, the resulting combination would not result in a combination of at least one “large” dendrimeric compound and at least one “small” species selected from the group consisting of

polyalkyleneimine, polyallylamine, starch, sugars, and polymers or copolymers of vinyl alcohol or allyl alcohol, as recited in independent claims 1, 9, and 17.

In light of the above, it cannot be said that there is suggestion or motivation sufficient to enable one skilled in the art to turn to this combination of references to achieve the claimed invention. Recently, the Supreme Court issued its opinion on *KSR v. Teleflex*. Clearly, the combination of references used by the Examiner to reject the claims of the present application is not a combination that one skilled in the art would turn to in arriving at the present invention. Thus, it cannot be said to have been obvious to one of ordinary skill in the art to combine the teachings of Talley, Klomp, and Colle.

Furthermore, nowhere in any of Talley, Klomp, or Colle is there any teaching or suggestion of use of at least one “small” species selected from the group consisting of polyalkyleneimine, polyallylamine, starch, sugars, and polymers or copolymers of vinyl alcohol or allyl alcohol, in combination with at least one “large” dendrimeric compound, to produce the claimed bimodal composition recited in independent claims 1, 9, and 17.

Therefore, because neither Talley nor Klomp nor Colle contain a suggestion or motivation for their combination, and because neither Talley nor Klomp nor Colle teach the claimed combination of at least one “large” dendrimeric compound and at least one “small” species selected from the group consisting of polyalkyleneimine, polyallylamine, starch, sugars, and polymers or copolymers of vinyl alcohol or allyl alcohol, as required by independent claims 1, 9, and 17, it cannot be said that the present application is obvious over the references, whether considered separately or in combination. Neither Talley nor Klomp nor Colle, whether considered separately or in combination, teach, suggest, or motivate the claimed invention as recited in independent claims 1, 9, and 17. Therefore, independent claims 1, 9, and 17 are patentable over all three references. Dependent claims are patentable for at least the same reasons. Accordingly, withdrawal of this rejection is respectfully requested.

Respectfully submitted,

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